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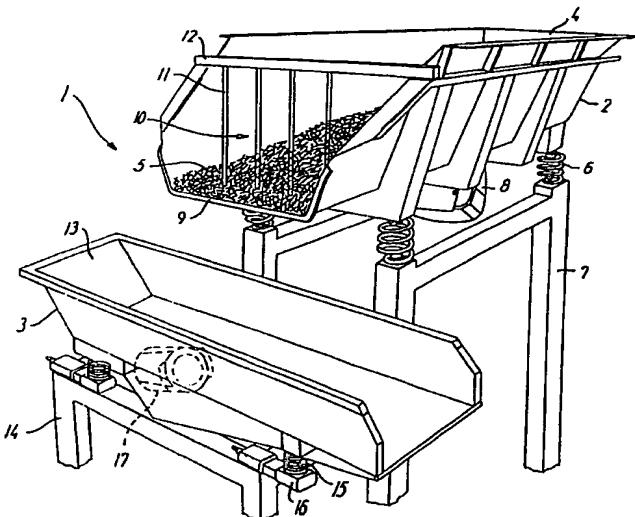
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B28B 1/52 // B28C 5/40 B01F 15/02		A1	(11) International Publication Number: WO 91/14551 (43) International Publication Date: 3 October 1991 (03.10.91)
(21) International Application Number: PCT/DK91/00093		(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US.	
(22) International Filing Date: 27 March 1991 (27.03.91)			
(30) Priority data: 0788/90 28 March 1990 (28.03.90) DK			
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(54) Title: A METHOD OF DOSING FIBRES



(57) Abstract

In a method of dosing fibres, such as steel fibres to be mixed in concrete, a supply of fibres (5) is stored in first vibration feeder (2) and is moved from this by means of a second vibration feeder (3). For each dosing operation, a proportioned quantity of fibres (5) is transferred at a stepless rate or a stepwise declining rate from the first to the second vibration feeder (2, 3) while the second vibration feeder (3) stands still. This vibration feeder (3) then transports the transferred fibre quantity further on to the subsequent process while the first vibration feeder (2) stands still. The fibres can hereby be dosed more accurately and uniformly than known before.

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A method of dosing fibres

1 The invention concerns a method of dosing fibres, such as
5 steel fibres to be mixed in concrete, and where a supply of
fibres is stored in a first vibration feeder and is fed
from this by means of a second vibration feeder.

10 Fibres of various types are used today to an increasing
degree for i.a. reinforcement of cast materials. Thus,
reinforced concrete can be produced by adding steel fibres
directly during the actual mixing process, which must then
be distributed very carefully and uniformly if the finished
concrete is to have the required homogenous and isotropic
15 properties. However, this has not been possible to a
satisfactory degree by means of the conventional dosing
methods which tend to feed the steel fibres in the form of
more or less tangled lumps.

20 The Danish published publication 153 450 B discloses a
method and an apparatus for improving steel fibres which
are present in bundles or packed lumps, and which,
directionally oriented, are to be dosed to an airborne
stream of material, such as a sprayed concrete mass. This
25 takes place by tearing the bundles or the lumps apart in
preferably a rotating drum with inwardly facing pegs, and
gradually discharging the loosened steel fibres during the
rotation through variable opening in the drum on an
inclined chute, where the fibres are replaced by sliding
30 down the chute under the action of gravity, said chute
being constricted in a direction toward the lower end. The
fibres now unidirectional are then sucked by a strongly
sucking air stream into a pipe stub and further into a
transport conduit, in which the unidirectional fibres are
35 fed in an even flow to the mouthpiece in a spray assembly
and are sprayed together with the concrete mass mentioned

- 2 -

by way of example onto a surface. Tangled fibres can hereby effectively be loosened from each other and be conveyed in an evenly dosed stream with unidirectionally oriented fibres to and be used in e.g. a spray assembly for successive application of fibre-filled concrete on a surface. 5 However, this known method is unsuitable when the fibres are to be used as reinforcement in cast concrete. The reason is that in this case the fibres are to be fed to the concrete mixer evenly and uniformly within a relatively 10 short period of time in a predetermined portion in a loosened, but precisely not unidirectional state.

The object of the invention is therefore to provide a method of the type stated in the opening paragraph by which 15 it is possible to add a predetermined quantity of fibres to a process more accurately and uniformly than known before.

This is achieved in that the method of the invention is characterized in that a quantity of fibres proportioned for 20 a dosing operation is transferred at a stepless rate or a stepwise declining rate from the first to the second vibration feeder while said feeder stands still, and that the second vibration feeder transports the transferred fibre quantity further on while the first vibration feeder 25 stands still. The tangled fibres are hereby loosened from each other during the vibrations already in the first vibration feeder, which can therefore add to the second vibration feeder an evenly distributed layer of loose fibres which can then rapidly and uniformly be introduced 30 into the mixing process at the desired time.

With a view to accurately proportioning the quantity of fibres to be used in each individual case, the fibres can be transferred according to the invention at an initially 35 relatively great rate and in the end phase at a considerably lower rate.

When the vibrations are generated by electromagnetic vibrators and the second vibration feeder is positioned on electronic weighing cells, dosing may be automatized in an
5 advantageous embodiment of the method of the invention in that the instantaneous amplitude of the vibrations of the first vibration feeder is determined by signals which the weighing cells currently apply to a preprogrammed control unit to which the respective vibrator is connected, and
10 that the vibrator of the second vibration feeder is activated by signal which are applied via the control unit by the process for which the fibres are to be used.

Further, according to the invention, to additionally ensure
15 that tangled lumps do not leave the first vibration feeder, the fibres can be transferred through a net or a grate which is provided on the first vibration feeder at a distance behind its outlet edge substantially transversely to the transport direction of the fibres.

20 The invention will be explained more fully below with reference to the drawing, whose sole figure shows an advantageous embodiment of a dosing system for performing the method of the invention. This system, which is generally designated 1, comprises a first vibration feeder 2 and a second vibration feeder 3.

30 The first vibration feeder 2 has a trough 4 with such a great capacity that it can simultaneously serve as a storage silo. The trough 4 is open upwardly and may therefore suitably be filled with fibres 5 from e.g. sacks or cartons (not shown). The trough 4 is placed on a first frame 7 via a first set of springs 6 and is vibrated by means of a first electromagnetic vibrator 8. A grate 10 is provided at a distance behind the outlet edge of the trough, said grate consisting of a plurality of bars 11

which are suspended from a transverse rod 12.

5 The second vibration feeder 3 has a trough 13 which is positioned transversely below the outlet edge 9 on the trough 4 of the vibration feeder 2. The trough 13 stands on a second set of springs 15 which are supported by a second frame 14 via a set of electronic weighing cells 16. A second electromagnetic vibrator 17 serves to vibrate the second vibration feeder 3.

10 As shown the trough 4 of the first vibration feeder 2 contains a supply of fibres 5. When a quantity of these fibres is to be used for a process, the first vibration feeder 2 is activated via a preprogrammed control unit (not shown), whereby the vibration feeder 2 initially vibrates fibres into the trough 13 of the vibration feeder 3 at a great rate and finally at a low rate. The entire fibre supply in the first vibration feeder 2 is kept in constant movement during this, so that the tangled structure is 15 loosened completely, no matter whether the trough is filled completely or is almost empty. The bars 11 of the grate 10 have such a mutual distance that the fibres can only pass the grate when they are not tangled. The fibres will therefore drop out through the grate 10 in a loose state and be 20 conveyed further on toward the outlet edge 9 in a relatively thin, loose layer.

25 During the transfer, the transferred amount of fibres is weighed by means of the electronic weighing cells 16, which 30 currently apply a signal representing the transferred weight to the control unit. When the transfer of the fibres has reached the final phase the control unit, which is programmed accordingly, signals the vibrator 8 to reduce the vibrations so that they correspond to a relatively small 35 transfer rate. When the entire desired quantity has been transferred, the weighing cells 16 then signal the vibrator

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8 via the control unit to stop the vibrations, and even if these cannot instantaneously be caused to stop, the transferred quantity will nevertheless be metered with a very great accuracy because of the small transfer rate at the 5 stop time.

During this entire transfer of fibres the second vibration feeder 3 stands still, and the fibres therefore settle as a thin loose layer on the bottom of the trough 13 of this 10 feeder 3. When the subsequent process is to use the fibres, a signal is applied via the control unit to the vibrator 17 of the second vibration feeder 3, said vibrator 17 then vibrating the second vibration feeder 3 so that the metered quantity of fibres is added uniformly and rapidly to the 15 process, which may e.g. consist in mixing concrete with steel fibres. During this part of the operation the first vibration feeder stands still, so that no form of material movement simultaneously takes place between the two vibration feeders.

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The system may also comprise several first vibration feeders 2 for their respective types of fibres which may then be added in sequence or blended to the subsequent process.

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P a t e n t C l a i m s:

1. A method of dosing fibres, such as steel fibres, which
5 are to be mixed in concrete, and where a supply of fibres
is stored in a first vibration feeder and is fed from this
by means of a second vibration feeder, c h a r a c t e r -
i z e d in that a quantity of fibres proportioned for a
dosing operation is transferred at a stepless rate or a
10 stepwise declining rate from the first to the second feeder
while said feeder stands still, and that the second
vibration feeder then transports the transferred fibre
quantity further on while the first vibration feeder stands
still.
- 15 2. A method according to claim 1, c h a r a c t e r -
i z e d in that the fibres are transferred at an initially
relatively great rate and in the end phase at a consider-
ably lower rate.
- 20 3. A method according to claim 1 or 2, wherein the
vibrations are generated by electromagnetic vibrators and
the second vibration feeder is positioned on electronic
weighing cells, c h a r a c t e r i z e d in that the
25 instantaneous amplitude of the vibrations of the first
vibration feeder is fixed by signals which the weighing
cells currently apply to a preprogrammed control unit to
which the respective vibrator is connected.
- 30 4. A method according to one or more of claims 1, 2 or 3,
c h a r a c t e r i z e d in that the vibrator of the
second vibration feeder is activated by signals which are
applied via the control unit by the process for which the
fibres are to be used.
- 35 5. A method according to one or more of claims 1 - 4,

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characterized in that the fibres are transferred through a net or a grate which is positioned on the first vibration feeder substantially transversely to the transport direction of the fibres.

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6. A method according to one or more of claims 1 - 5, characterized in that the net or grate is positioned at a distance behind the outlet edge of the first vibration feeder.

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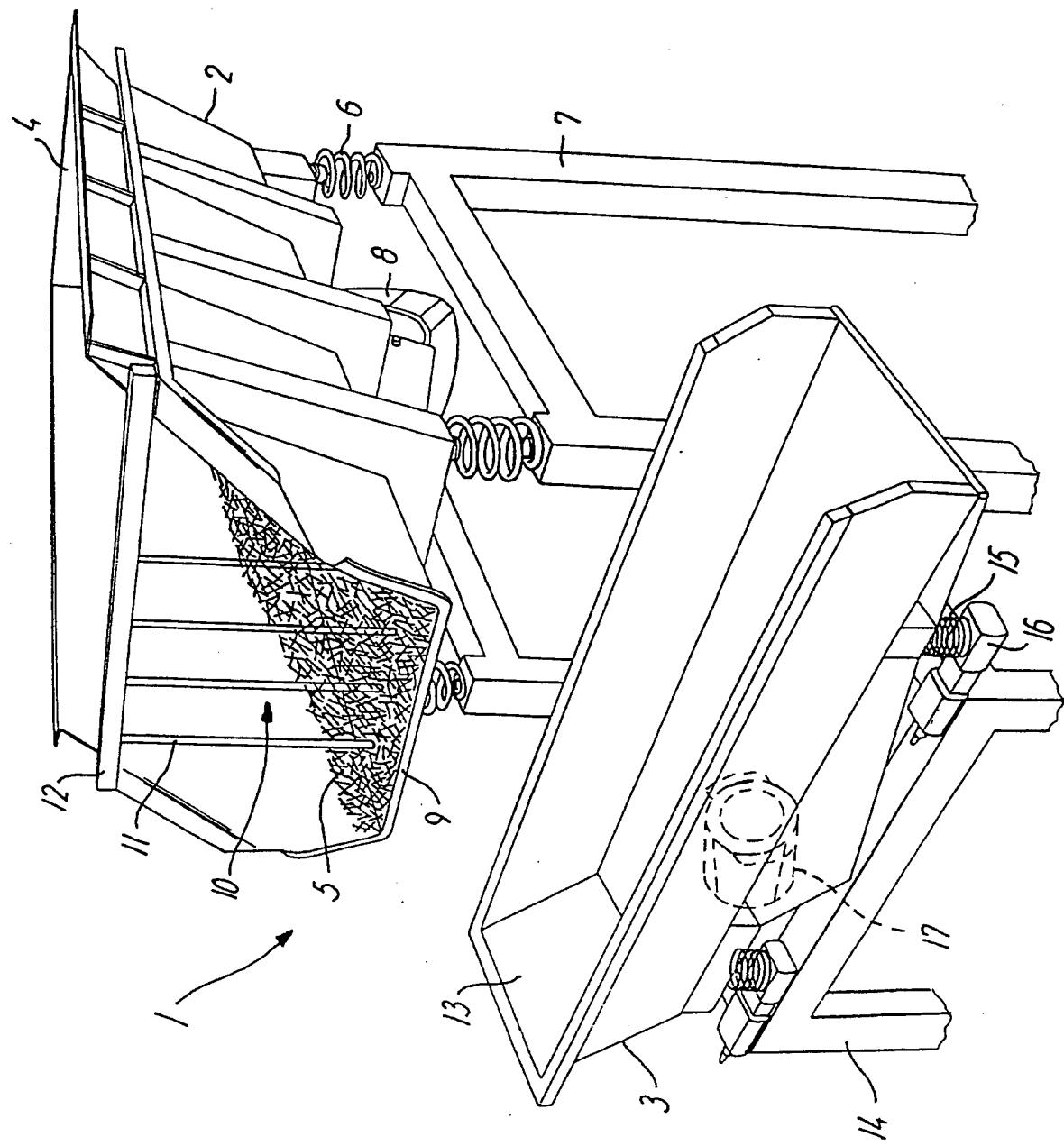
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INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 91/00093

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 28 B 1/52 // B 28 C 5/40, B 01 F 15/02		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	B 28 B; B 28 C; B 01 F	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE, DK, FI, NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category	Citation of Document ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	SE, B, 447080 (VERTEX INTERNATIONAL AB) 27 October 1986, see figure 1, detail 3 --	1
Y	US, A, 3638922 (H.G. GUGLIETTI) 1 February 1972, see figure 1, details 16, 17 and 20 --	1
A	DK, B, 153450 (B. SANDELL) 18 July 1988, see claim 1 --	
A	DE, B2, 2337129 (CALEDONIAN MINING CO. LTD.) 1 February 1979, see figure 1, detail 26 --	
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
12th June 1991	1991-07-01	
International Searching Authority	Signature of Authorized Officer	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		Relevant to Claim No
Category	Citation of Document, with indication, where appropriate, of the relevant passages	
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A	FR, A5, 1288860 (SOCIETE LIGERIENNE ET ORLEANAISE DE MATERIAUX) 19 February 1962, see detail 5 --	
A	FR, A1, 2401005 (P. FOUCAULT) 23 March 1979, see figure 1 --	
A	US, A, 2863651 (R.J. MCBRIDE) 9 December 1958, see figure 1 -- -----	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 91-04-30. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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US-A- 2863651	58-12-09	NONE		